Exhibit 3

In The Matter Of:

Honeywell International Inc., et al. v.
Hamilton Sundstrand

Trial Volume Number 2
February 6, 2001

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make [14] commitments to our customers, make sure our [15] products of high qualities, they're reliable, [16] delivered on time, and we execute all our program [17] equipment. We obviously need to make financial [18] and internal metrics such as sales income, cash [19] flow, safety metrics, our inventory and so forth, [20] making sure all aspects of the business are [21] managed effectively, then finally continuing to [22] deploy innovative growth strategy and technology [23] to make sure we can maintain a good position on [24] the marketplace. That's sort of my first job.

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[1] The second part of my job is to make [2] sure that the company has the resources to really [3] accomplish all of the foregoing, which is all [4] about people. I probably spend half of my time on [5] people to make sure we've got the right people in [6] the right job, coaching, mentoring, development of [7] careers, a lot of education, providing for [8] education of people to make sure that the human [9] resource, which is at the end of the day all we [10] really have in a company, is effectively deployed [11] for the business objectives.

[12] **Q:** I'd like to talk a minute about larger [13] Honeywell, Honeywell International. Could you [14] share a little bit about the company of which you [15] are a part?

[16] **A:** Yeah. Honeywell International is today a [17] terrific company, it's a 25 billion dollar [18] industrial conglomerate. It is one of the [19] companies which has been around for 124 years. It [20] is one of the stocks that makes up the Dow Jones [21] Industrial Average that you're familiar with. But [22] today, Honeywell has a broad portfolio. There's [23] industrial controls, in fact, controls that [24] control air conditioning and heating and

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[1] ventilation systems in large buildings such as [2] this, and, in fact, it does control the system in [3] this building.

[4] It's also home and building [5] controls, you're all familiar with the thermostat, [6] the famous thermostat on the wall which is a [7] little tiny thing but it's all a part of a system [8] of home controls, and that's in 140 million homes [9] in the world. We manufacturer little screens that [10] are like the laminate materials, electronic and [11] circuit cart assemblies that go on PCs, the little [12] green circuit cards inside of Motorola phones for [13] example, some of the electronic materials we [14] manufacture.

[15] Then automotive, we have I'm sure [16] you've heard of Prestone, Autolite, Fram, Bendix [17] Brakes, a number of automotive brands, we build a [18] huge number of turbochargers.

[19] Then finally we have our aerospace [20] businesses, which I'm most familiar with, where we [21] build a lot of cockpit equipment. When you look [22] at the cockpit pit of a jet, almost everything [23] that's in there is some piece of equipment we [24] build, safety equipment, weather radar, enhanced

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[1] ground assembly, communication, navigation devices [2] and so forth. We build systems in equipment, [3] auxiliary unit is one example of that that allows [4] modern aircraft, both military and commercial to [5] be, to effectively accomplish their mission. High [6] technology equipment in systems such as electric [7] power systems, air turbine start systems, the [8] pneumatic bleed system in air conditioning as well [9] as propulsion and APUs, which you've heard about.

[10] **Q:** How many people work at Honeywell?

[11] **A:** We have about 125,000 people. We're [12] probably manufacturing and service locations well [13] over 300 locations, and we're probably operating [14] around 13 or more countries around the world. [15] Counting service locations, it would be a lot more [16] than that.

[17] **Q:** Now, let's talk about your part of the [18] bit business. How many people work in your part [19] of the business?

[20] **A:** As I mentioned, I'm responsible or [21] engines and systems. Engines and systems is [22] approximately half of our aerospace business. [23] Engines and systems today is a five billion dollar [24] company. We have just under 20,000 employees. I

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[1] have just under 20,000 employees in my direct [2] charge, and we're operating about, you think about [3] our business, about 25 manufacturing locations in [4] about 10 different countries around the world. So [5] engines and systems itself is a large business, [6] but it's also a global business and one we're [7] quite proud of.

[8] **Q:** Mr. Loranger, could you push the [9] microphone a little bit away from you? That's [10] better, because we're getting a little bit of [11] feedback; thank you.

[12] Well, let's talk about Garrett. You [13] started working, when you first started working [14] for Honeywell Company back in 1981, for Garrett. [15] Could you tell us a little bit about Garrett?

[16] **A:** The Garrett Corporation is really the [17] predecessor of the technology of what today makes [18] up actually most of engines and systems. It was [19] started back in the late '30s by Griff Garrett, [20] one of the pioneers in the aviation world. It, in [21] fact, was a company that was known as an innovator [22] in technology all through the emerging aviation, [23] the jet age space age, a company that was [24] continuously pushing the edges of the technical

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[1] envelope to develop innovative products to make [2] airplanes, as you know, higher and faster and [3] farther in the sort of wonderful evolution of [4] aviation that occurred over the last 50 years.

[5] So Garrett Corporation, a high tech [6] knowledge diverse aerospace corporation started in [7] the late '30s or early '40s, and that company [8] today is essentially almost the same company that [9] engines and systems represents.

[10] **MR. ZIEGLER:** Could we possibly, [11] Your Honor, ask the witness to try to refrain from [12] going beyond the actual question?

[13] **THE COURT:** I'll keep an ear open [14] for that, Mr. Ziegler.

[15] **BY MR. KRUPKA:**

[16] **Q:** Could you tell us, please, Mr. Loranger, [17] did APUs exist back when Garrett was still Garrett [18] before it became part of Allied Signal and part of [19] Honeywell?

[20] **A:** Absolutely they did. The APU business [21] has been in existence for quite some time.

[22] **Q:** What was the origin of APUs?

[23] **A:** As I mentioned, it actually in the [24] emergence of this so-called jet age in the early

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[1] to mid '40s, it became evident not only to our [2] self but to our customers that they needed a very [3] high power source of auxiliary power on board an [4] aircraft that could produce high energy air and [5] electricity to manage the systems of the [6] aircraft.

[7] So in the mid '40s we made the very [8] first auxiliary power unit. By the early '50s, it [9] had been installed on aircraft, and the rest is [10] history; virtually all aircraft today have them.

[11] **Q:** Commercial aircraft, did they used to [12] have APUs on board?

[13] **A:** The very early ones, no, they didn't. I [14] believe the Boeing 707 was the last commercial [15] aircraft that did not have an APU on it. And I [16] believe, I'm not for sure, but I believe either [17] the British aerospace Carovel, or excuse me, the [18] French Carovel or the Boeing 727 back in the early [19] '60s time frame were the first commercial [20] transports to have APUs on them, and all [21]

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surge controls [13] will work so that the equipment will work properly [14] in the field when it's started up.

[15] **Q:** And am I right you no longer work for [16] Exxon; is that correct, sir?

[17] **A:** That's correct. I left Exxon in 1986.

[18] **Q:** What have you done for the last 15 years?

[19] **A:** After that I started my own company and [20] continued to do much of they work I had done at [21] Exxon, but in addition, I also expanded into other [22] areas as well.

[23] **Q:** Okay. And have you been familiar during [24] your 30-year career, sir, with the evaluation of

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[1] control systems for compressors and gas turbines [2] like those used in the APU?

[3] **A:** Yes, throughout the entire period while [4] at Pratt & Whitney, while at Exxon and since [5] leaving Exxon, I've worked on several projects [6] which have involved the world's largest gas [7] turbines.

[8] **MR. PUTNAM:** With Your Honor's [9] permission, I would like to ask Mr. Muller to step [10] down and to point out to the jury the different [11] parts of the APU that we have got here.

[12] Is that okay?

[13] **THE COURT:** Yes.

[14] **MR. PUTNAM:** Mr. Herrington, do [15] what you want. I'm going to come around.

[16] With the Court's permission I would [17] invite Mr. Herrington to move to where he needs [18] to.

[19] **THE COURT:** That is fine.

[20] **THE WITNESS:** I should apologize [21] first — I gather this is working.

[22] I should apologize first because of [23] the way that we had to situate the gas turbine, [24] Your Honor will not be able to see the description

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[1] of each component.

[2] **THE COURT:** I'll probably move [3] around.

[4] **THE WITNESS:** Fine. May I also ask [5] if the jurors have difficulty in seeing, if [6] they're free to move about, if they wish?

[7] **THE COURT:** Yes, that is [8] acceptable.

[9] **BY MR. PUTNAM:**

[10] **Q:** Mr. Muller, the jury has heard a couple [11] of references to this, but it's been off in the [12] corner. Maybe you can start at a level of [13] generality and explain the major different [14] components we've got here, and then we can focus [15] in on them in a little bit more detail.

[16] **A:** Yes. Everything you see here, everything [17] you see here comes under the general category —

[18] **THE JUROR:** I'm going to look over [19] your shoulder.

[20] **THE WITNESS:** If you want to get a [21] little closer.

[22] Everything that you see here, there [23] are several components, and because of the special [24] function, it has the general category of auxiliary

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[1] power unit for the reasons that were described to [2] you earlier.

[3] Because it provides compressed air [4] and electrical power on the aircraft itself, so [5] that the aircraft does not have to depend on [6] anything on the ground at all. And wherever it [7] goes, it can always turn it on and make sure that [8] the proper temperature is maintained for the [9] passengers in the aircraft, as well as making sure [10] that there is electrical power for the cabin [11] lights and for the controls.

[12] So it's a very powerful unit and [13] does a very important function.

[14] There are two basic, two basic [15] components in its basic operation. And they are [16] two separate functions entirely.

[17] This portion here, from here back to [18] here is the gas turbine. This is the portion that [19] actually generates the power at a constant speed [20] which is very high.

[21] This might be an appropriate time to [22] mention as well that the auxiliary power unit is [23] fairly small. This is about four or 500 [24] horsepower.

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[1] **BY MR. PUTNAM:**

[2] **Q:** Mr. Muller, let me interrupt you. This [3] model is, is this a life-size model of the [4] 331-200?

[5] **A:** Yes. This is a life-size model of this [6] particular model of the 331 APU model.

[7] It is actually made up of actual [8] components that, for the purpose of demonstration [9] for engineers, and for tradeshows, and the various [10] functions, and also, to evaluate just for a [11] pictorial sense, they have actually taken actual [12] components and just cut into it, so you get a nice [13] visualization.

[14] This is not what was in mind when [15] they did this. This was not done expressly for [16] this purpose.

[17] **Q:** So I think you were explaining the back [18] half is the turbine section?

[19] **A:** Yes. And from here — now, from here and [20] perhaps we'll go into a bit more detail [21] afterwards, after each component, from here, air [22] flows in through here and as air flows through [23] here, you can see in here what is called an [24] impeller.

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[1] And, basically, what happens is [2] this, as it rotates in this direction, you have to [3] be very careful here, this is very sharp, as it [4] rotates in this direction. It's, basically, like [5] a fan draws air in and it moves it up, and it [6] moves it up at a very high speed into this blue [7] area.

[8] And what you see in this blue area [9] is the air is coming in. It's kind of a large [10] area in the front and then as it moves up here, it [11] gets squeezed into this small area.

[12] And this is where the compression [13] which is referred to occurs. It goes from a big [14] area to a small area.

[15] Then it goes through this channel, [16] that's just a channel, goes through what are [17] called some vanes to kind of straighten it out [18] because it's all mixed up. And then in the gas [19] turbine, it then reflows in a second impeller, [20] these are called impellers.

[21] And the same function occurs again [22] here as occurred here, which is additional [23] pressure is increased.

[24] The reason is because for the gas

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[1] turbine to function, it needs certain pressure of [2] gas. And once it has a certain high pressure of [3] gas, which is necessary for combustion to occur, [4] it then, at that point, continues, and notice by [5] the way, the flow is continuous. It just flows [6] around the blue here, comes back up here.

[7] Now, something else happens. In [8] this portion here is what is called a combustion [9] area.

[10] Now, the colors are made to denote [11] what the temperature would be, so that it's easier [12] to follow.

[13] You also might notice, by the way, [14] this is all sheet metal, so it really is sheet [15] metal. And that's important to keep in mind [16] because all the air comes in here and flows around [17] the outside to keep this cool.

[18] But a lot of the air flows into what [19] is called the combustion chamber. And in the [20] combustion chamber, there are actual nozzles that [21] spray in fuel, pretty much like the gas on the oil [22] furnace in one's house.

[23] It's spraying in the fuel, it's [24] combining with air. This high pressure air is

[6] But to be sure you have enough [7] electrical power, both engines are identical, they [8] both provide electricity, to make sure that you [9] have electricity, which is important to the [10] operation of the controls and all the navigation [11] equipment, what they do is they turn this back on [12] again.

[13] And the flow is very, very low and [14] they can stay at a constant very, very low flow, [15] which is very unusual for an extended period of [16] time, while the APU is solely providing [17] electricity as a back-up to make sure if anything [18] happens, they will have two independent sources of [19] electricity, even though one engine is operating.

[20] **Q:** Thank you, Mr. Muller. Let me ask you to [21] resume your seat for now.

[22] **MR. PUTNAM:** And for my pacing, [23] Your Honor, what time would you like to take the [24] morning break?

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[1] **THE COURT:** Eleven clock.

[2] **MR. PUTNAM:** Eleven clock. Thank [3] you, Your Honor.

[4] **THE COURT:** Which means 15 minutes. [5] I'm going to try to get that fixed.

[6] **MR. PUTNAM:** Thank you, Your Honor.

[7] **BY MR. PUTNAM:**

[8] **Q:** Mr. Muller, the jury has heard a number [9] of references to this thing called surge and I [10] asked you when you were up at the model to [11] identify where the surge valve in this particular [12] APU was.

[13] Can you tell me or tell the jury, [14] rather, what surge is?

[15] **A:** Well, surge has to do with the [16] characteristic of how this compressor works.

[17] So — can you hear me all right — [18] you see there you have the simple impeller, and it [19] has on the load compressor, and as I described [20] with the inlet guide vanes, that you open and [21] close them, the amount of flow goes from maximum [22] flow to a minimum flow.

[23] Characteristic of these compressors [24] is when you want maximum flow, it's not a problem,

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[1] you just kind of open it up. You open up the [2] vane, the maximum flow of air goes through.

[3] The compressor can do that very [4] simply with no concern whatsoever for years at [5] times, depending on how well it's designed.

[6] But when you start to reduce the [7] flow, keeping in mind that this is a very [8] sensitive piece of equipment, it's operating at [9] very high speeds and it's, in many ways, like a [10] race engine. Where race engines, where they [11] operate within the normal range, a very narrow [12] range of speeds, they can be very powerful.

[13] But if you try to get them operating [14] at low speeds they rumble. They don't work well. [15] They don't work as well as a regular engine, which [16] is not running as hard as a race engine.

[17] You can think of this as a race [18] engine. That is, when it's operating at maximum [19] flow and medium flow, it's fine, but when it gets [20] down to a very low flow condition, these [21] compressors begin to have the stress.

[22] They have to be carefully [23] controlled. They have to be babied. It's a [24] little bit like a situation when you were driving

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[1] home a few days ago, and when you drove here, it [2] was easy to drive, you could maneuver your car [3] very easily, and you could change lanes easily.

[4] But when you went home and there was [5] ice on the road, you ought to be very, very [6] careful because stability became very important. [7] And that's what happens at very low flow here.

[8] The stability of the compressor [9] becomes very natural and it can go into a [10] phenomena called surge.

[11] **Q:** Can you explain a little bit more about [12] what this surge condition is?

[13] **A:** We struggled with trying to find a way to [14] physically express how surge works. And we took a [15] few shots at it.

[16] We'll see how comfortable you are [17] with this.

[18] Surge is, basically, a phenomena [19] where as you go to lower and lower flows, these [20] compressors have a harder and harder time [21] generating the pressure to go into something.

[22] It's a little bit like this. If you [23] were to visualize, you first take a straw, a large [24] straw and you're blowing through it easily. And

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[1] as you're blowing through it easily, you're not [2] generating much pressure, it's easy to do.

[3] Visualize you take this plastic [4] straw and as you're blowing through it, you begin [5] to squeeze it down a little bit. And as you do [6] that, you find it takes more effort.

[7] You squeeze down a bit more effort, [8] trying to keep the same amount of flow going [9] through. That's what the compressor is doing.

[10] As the flow is reducing, the [11] pressure is increasing because now that it has a [12] restriction, it's trying to keep the same amount [13] of flow going through. So it has to generate more [14] pressure to push it through. It can continue to [15] do that for a while until you get to low flow.

[16] Now low flow, the way of thinking of [17] that is if at the end of this plastic pipe you put [18] a balloon, and visualize, you get a large [19] balloon. And as you're blowing on the balloon at [20] very low flow, the balloon is increasing this [21] size; the pressure is increasing.

[22] But after a while, you keep blowing [23] on it. You can't blow on it, the pressure is too [24] high, and you have to let it go.

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[1] As you let it go, the flow in the [2] balloon will come rushing back. Then you say, oh, [3] but someone told me I have to keep blowing the [4] balloon back up, and you blow the balloon back [5] up.

[6] But then you run out of breath, you [7] let it go, it comes surging back. And that's [8] where that word comes from.

[9] In reality, that's what you [10] physically see on a compressor when it's in [11] surge. You see flow going out and then when the [12] compressor can't generate enough, just like you [13] can't blow enough into the balloon, it suddenly [14] stops working and it rushes back.

[15] And we have a little animation, [16] don't we?

[17] **Q:** Yes. Let me ask the preparatory [18] question.

[19] Were you involved in preparing an [20] animation to try to illustrate a little bit about [21] this surge condition?

[22] **A:** Yes, I was.

[23] **Q:** Okay. Let me ask Mr. Schlaifer to run [24] the first part of the animation and, hopefully,

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[1] the jury in front — I think the jury will be able [2] to see it, and if not, maybe ask you to stand up.

[3] I think you'll be okay. I know this [4] is a big piece of equipment.

[5] And why don't you narrate, [6] Mr. Muller, what we're seeing.

[7] **A:** What you're seeing here is kind of normal [8] operation where flow would be going out of the [9] cabin and then out of the exhaust. But if you had [10] a malfunction in the surge control system or bleed [11] control system, they're used interchangeably, what [12] would happen is what I just described is the [13] balloon blowing up and the air coming back.

[14] And in the aircraft what you would [15] see is you would actually see at the air

based on a — is based on a Sundstrand document which is figure 12a in this big thick ECB document. That's what it was taken from.

Q: Let me ask you, maybe I'll lay a chart over here in a minute, if you can relate this one figure we have just gotten up to the overall figure that you have there.

A: Okay. This is — here, this is what is called BCV closed loop PI surge control. This figure 12a, which is all of this.

And the DLPPS and T2 that are indicated here refer to these things, exact same thing. So, basically, you can see why, you know, this is just a, just a blot showing what's really inside here.

Q: How about the variable BCV TCL that's shown on the overall chart coming out, is that shown on this chart?

A: Yes. That's this green — this light green, BCV TL is the same as this light green shown here.

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You can see the reason why to the color coding, because it's easier to follow.

Q: Let me ask you about Figure 12b, do you also have a chart prepared for Figure 12b?

A: Yes, I do.

Q: Let's do the same thing. First of all, I'll show the jury 12b, and then I'll ask you, again, to relate it to the overall logic diagram.

A: Here it's 12 — 12b shows where measurements are made of pressure at the discharge, pressure at the — pressure at the inlet of the compressor, IGV position, temperature T2, again, measured at the inlet of the compressor, and IGV position, which you actually have an electrical device on top of the IGV.

And as it rotates, it gives you a signal in proportion to the amount that's opened. That's why it's shown in percentage.

Q: And am I right, again, that the colors that are on the chart you have added?

A: Yes, I have.

Q: But other than the coding for the colors at the top, the source of the chart is?

A: The source of the chart comes from

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Sundstrand's ECB document.

Q: And again, let me play chart holder.

A: But I haven't finished with this yet. I just want to indicate that there is, also you see a term here DELPQP, this is not a measured value, this is a calculated value. So it's shown separately.

It will be discussed shortly. What the output is, which is shown in red here, which is BLDSEL, which is bleed select. And basically, the selection is to tell the surge control system if it's operating at the high end of the flow or if it's operating at the low end of the flow where surge is possible.

The logic being that when you're at the high end of the flow chart, there is no possibility for surge. But when you're at the low end, there is possibility for surge and the surge control system has to work hard to avoid it.

Q: Okay. Can I be the chart holder now?

A: Please.

Q: Okay. Let me hold this up.

I apologize for blocking the court staff momentarily. Can you, again, relate this

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diagram to the overall diagram?

A: Yes. This diagram here refers to this item here, which is shown as Figure 12b.

Q: And can you match up to inputs and the outputs like you did last time?

A: Yes. Here are the measured values, P2, PS2, actually position. They are the same as here. It's repeated twice here because how it's shown, and BLD select is this value here, which is shown as zero one. And that feeds into the logical sequence here.

Q: Mr. Muller, I want to turn now to the Honeywell patents, the '194 and '893 patents that are the subject of this lawsuit.

A: Excuse me, do you want me to return to the witness stand?

Q: Actually I think with the Court's permission, I want you to stay there because you can refer to these diagrams that we just introduced to the jury.

Let me ask you the question, have you formed an expert opinion as to whether the Sundstrand surge control system that's illustrated there infringes the claims of the Honeywell '194

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and '893 patent?

A: Yes, I have.

Q: Okay. I'm going to take you through those claims one at a time, and let me start, if I can, and ask Mr. Schlaifer if he please can put up Claim 4 of the '194 patent.

And let me say while we're waiting, that the text, you have seen these before, a lot of text, small display — actually it's not bad, but I think you'll see we're going to be able to blowup pieces, so hopefully, as we go through them, it will be easier.

Mr. Muller, have you formed an expert opinion on whether Sundstrand APS 3200 infringes Claim 4 of the Honeywell '194 patent?

A: Yes, I have.

Q: And what is that opinion?

A: My opinion is that it does.

Q: And in your opinion, is that infringement literal or under the Doctrine of Equivalents?

A: Based on my understanding of what a literal infringement is, I believe it's literal infringement.

Q: Do you have an opinion if, whether there

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was a finding that there was no literal infringement, that there would still be infringement under the Doctrine of Equivalents claim?

A: I believe it's literal infringement, but implicit in that, if it's not literal, then it's so close, that it's, basically, equivalent.

Q: Now, on the left-hand side here we have the text of the patent claim, and on the right-hand side there, you have a column that says present in Sundstrand's APS 3200.

And in this one, there are three places where it says Sundstrand admits yes. What does that denote?

A: Well, my understanding is that in prior documents that Sundstrand has submitted in exchanges between Honeywell and Sundstrand, that they have admitted that these particular elements of the claim have been agreed to. That is, Sundstrand has agreed that they, in fact, infringe on these particular elements of Claim 4.

Q: Okay. Now, I'm going to ask you to go through this word by word, element by element because as Judge Sleet told the jury in the

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beginning, and as Mr. Ziegler indicated and Mr. Krupka indicated, we need to address every element of the claims and determine whether it's in the APS 3200.

So let me start with the first introductory part to Claim 4, and ask Mr. Schlaifer to actually blow that up so I can see it a little bit larger.

[9] "A method of utilizing a compressor [10] of a gas turbine engine to power pneumatically [11] operated apparatus having a variable inlet air [12] flow demand, the compressor having adjustable [13] inlet guide vanes, said method comprising the [14] steps of:"

[15] In your opinion, is that part of [16] Claim 4 of the '194 patent met by the APS 3200?

[17] **A:** Yes, it is.

[18] **Q:** Can you briefly explain why?

[19] **A:** Well, just going through the sentence, a [20] method of utilizing a compressor of a gas turbine [21] engine. And this is the compressor of the gas [22] turbine engine.

[23] To power pneumatically operated [24] apparatus, powering pneumatically operated

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[1] apparatus, refers to pressurized air to the [2] aircraft, which goes through an environmental [3] control system with a pneumatically operated [4] apparatus, having a variable inlet air flow [5] demand.

[6] We have guide vanes which vary the [7] inlet air flow demand. It's the BCV that has — I [8] got ahead of myself. This is not easy to read.

[9] I've been reading these for months. [10] The pneumatically operated apparatus having a [11] variable inlet air flow, this concerns the [12] environmental air control on the aircraft, [13] adjustable inlet guide vanes.

[14] These are the inlet guide vanes that [15] are on the APS 3200, and the method comprising of [16] the next item.

[17] **Q:** Let's go to the next steps. The first [18] step of the method of Claim 4 reads, [19] Interconnecting a supply duct between the [20] compressor and the pneumatically operated [21] apparatus."

[22] I note that's one of the ones where [23] we have Sundstrand admits, yes, but let me go [24] ahead and ask you for the record, in your opinion,

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[1] does the APS 3200 system meet that limitation?

[2] **A:** Yes, it does.

[3] **Q:** Can you show the jury where?

[4] **A:** Basically, as shown, from the compressor [5] itself, there is a duct which connects through the [6] bleed control valve to another duct which [7] eventually goes to the aircraft, to pneumatically [8] operated apparatus.

[9] **Q:** The next step of Claim 4 of the '194 [10] patent reads, "flowing discharge air from the [11] compressor through said supply duct to the [12] pneumatically operated at apparatus."

[13] Again, I note that's one where [14] Sundstrand admits yes. Let me ask you, is that [15] present in the APS 3200?

[16] **A:** Yes. The prior one referred to the [17] actual duct.

[18] This is now referring to what is in [19] the duct, which is the air going through the [20] duct. So it's the same logic as before.

[21] It goes from the compressor and the [22] pressurized air goes to the pneumatically operated [23] apparatus on the aircraft.

[24] **Q:** Clause C of Claim 4 is a mouthful, so I

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[1] want to take it in little steps. The first clause [2] of the claim, Clause C, Claim 4 reads maintaining [3] an essentially constant minimum supply duct flow [4] rate, despite fluctuations in the flow rate of air [5] received by the pneumatically operated [6] apparatus."

[7] I'm going to ask you, sir, piece by [8] piece, and then I'll ask you the overall thing. [9] That's the way to deal with such a long claim [10] term.

[11] Does the APS 3200 meet that part of [12] Claim 4?

[13] **A:** Yes.

[14] **Q:** Can you explain to the jury why that is?

[15] **A:** Well, as I described to you earlier, when [16] it says maintaining an essentially constant [17] minimum supply duct flow rate, this is the duct [18] that we're talking about. And what is supplying [19] the flow rate is the load compressor.

[20] And that flow stays, stays at a [21] constant minimum, not simply at a minimum, but it [22] stays at a constant minimum, despite the changes [23] in the position of the bleed control valve, which, [24] as you recall, I mentioned that when it diverts

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[1] flow between these two, by the way, equal sized [2] pipes, the diameter of this pipe, this duct is the [3] same as the diameter of this, the same as the [4] diameter of this duct, so it can take the full [5] capacity of the flow coming out of the compressor.

[6] And what that says is that — so [7] this enables it then, that even if I move this [8] valve completely over for all the air to go to the [9] aircraft, the flow here will stay constant. If I [10] take at the same time and move that valve [11] physically over to the exhaust, the flow will go [12] to the exhaust, but the flow will remain [13] constant.

[14] The compressor does not really know [15] how much air is going here or here as the valve is [16] being activated.

[17] **Q:** The next part of Step C of Claim 4 of the [18] '194 patent reads, "by exhausting air from said [19] supply duct in response to variations therein in [20] the value of a predetermined, flow-related [21] parameter."

[22] Is that met or present in the APS [23] 3200?

[24] **A:** Yes.

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[1] **Q:** Explain why, please.

[2] **A:** Well, two parts. Again, the air going to [3] the supply duct, but now the question is what is [4] controlling that, and that goes back to what I had [5] shown earlier.

[6] And what the point is here — the [7] issue here is the exhaust air from the apply duct [8] I just described. Now, the other part of it is [9] the predetermined flow-related parameter.

[10] And this is the pre-determined flow [11] related parameter. Where you take the change in [12] pressure, divide it by the pressure, and that is [13] compared to a value on a curve.

[14] And that's the predetermined portion [15] is the curve. So you go to the value, you go to [16] the curve and pick off a value. That's what's [17] referred to there.

[18] **Q:** Why is that a flow-related parameter?

[19] **A:** Well, because as the — in that guide [20] vane change position on the load compressor, the [21] flow changes on the load compressor, and that [22] results in a change in pressure.

[23] For as the flow is changing, the — [24] there is a change in pressure inside the

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[1] compressor, and also there is a change in the [2] pressure at the discharge of the compressor.

[3] So when you divide this value by [4] that value, you always get a different value [5] depending on what the flow is.

[6] **Q:** Okay. The next part of Claim 4C reads, [7] "The flow rate of air exhausted from said supply [8] duct being related to the magnitude of said [9] parameter value variations in both a proportional [10] and time-integral manner."

[11] Is that part met by the APS 3200?

[12] **A:** Yes, it is.

[13] **Q:** Can you show where, please?

[14] **A:** Now, we're getting into describing the [15] proportional and time integral manner. I'll get [16] into that in a moment.

[17] But to get that, we start off as we [18] said earlier, you've got your flow rate and you [19] generate a signal, which is called

DELPQP. I only [20] mention it because it comes up again and again.

[21] But you generate a signal, and [22] eventually before I get into discussing how this [23] happens, but this is really referring to when it [24] goes into this part of the circuitry.

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[1] Now what it's doing here — perhaps [2] I should describe this.

[3] What it's doing here is it measures [4] flow, it measures flow. And then it compares it. [5] It compares it against a desired value, a desired [6] value where the flow should be at that [7] particular — at that particular location.

[8] It's like the examples you heard [9] about temperature variation. You have a set point [10] at a certain value, this is your set point here. [11] And where you want to be is here, and so what you [12] get is a difference.

[13] So sort of where I am and where I [14] would like to be.

[15] Now, in controlled terminology, [16] that's referred to as an error. It's just the way [17] it's done, it's called an error. It's their [18] world.

[19] So in controlled thinking, it's [20] referred to as an error. And then this is a [21] signal.

[22] But before you can do anything with [23] the signal, you have to do a couple more things [24] with it. You just can't take that difference and

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[1] push it out into the valve and try to turn the [2] valve around.

[3] You have to do something because [4] it's not a usable signal yet. You have to do [5] something.

[6] You have to pass it through what is [7] called the controllers, and there are two ideas [8] here. And that is called a proportional [9] controller and an integral control.

[10] And physically, I feel that one way [11] of understanding what a proportional controller is [12] is this idea: If you're driving home, and you're [13] trying to get home, home is your desired value, [14] that's where I want to go.

[15] Now, if I'm five miles away and I'm [16] in a rush, I have something to do at home. I'm [17] five miles away, I'm going to apply greater load, [18] make a greater effort to get there.

[19] The proportional controller does [20] that. It says, Gee, if I'm far away, I'm going to [21] drive harder to get there faster because I want to [22] get there.

[23] If that error, if that distance, if [24] you happen to be three blocks away from home,

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[1] still have the same desire and value, still want [2] to be there, you're not trying as hard, it's not [3] as much effort because it's only a few blocks [4] away.

[5] Now, having said that what the [6] proportional controller will do is when you drive [7] by your house, you're not going to stop at your [8] house. If your proportional controller is [9] controlling your car at that point, it's going to [10] go up to your house and go right past it.

[11] And then it's going to go down the [12] block and say, Woops, I missed the house, and it's [13] going to come back and drive back up the road [14] again. And this time it may also miss it, but not [15] go quite as far beyond the driveway.

[16] It will do this for a while. This [17] is what proportional controllers could.

[18] So to help the proportional [19] controller work properly what it has is what is [20] called an integral controller. And what it says [21] is, basically, that the proportional controller [22] gets you close to your house and then the integral [23] controller says, I know where the driveway is, and [24] it makes the car turn in the driveway and go to

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[1] your desired point.

[2] So what this does here is generate [3] information, electrical information, taking the [4] result of these flow measurements, it takes the [5] result of this comparison that's made here, takes [6] that information, and then processes it along the [7] lines I've just described it, and then, finally, [8] comes out with an electrical signal, a signal [9] which then can be used by the bleed control valve [10] in order to get to the position it should be.

[11] Not just going back and forth and [12] getting close and running back and forth, but [13] getting to where it should be. And that's the way [14] it's done.

[15] **Q:** Okay. And then —

[16] **A:** But I have to cover that proportional [17] integral at some time.

[18] **Q:** And based on that explanation, does that [19] match up with the portion of Claim 4 that was most [20] recently read into the record?

[21] **A:** Yes, it does.

[22] **Q:** The next part of Claim 4 reads, " said [23] maintaining step including the steps of providing [24] an outlet passage from said supply duct."

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[1] Is that present in the APS 3200?

[2] **A:** Yes. Yes.

[3] It's providing — the passage that's [4] referred to here is an outlet passage, including [5] the steps of providing an outlet passage from said [6] supply duct.

[7] Yes. These are the various passages [8] from the supply duct.

[9] **Q:** Okay. The next step, next part of Step C [10] of Claim 4 is, "positioning in said outlet passage [11] a surge bleed valve operable to selectively vary [12] the flow of air outwardly through said outlet [13] passage."

[14] Is that met in the APS 3200?

[15] **A:** Yes, it is. And it's met in what we have [16] been discussing now for a while, where the flow [17] comes out, it goes through the valve, and it goes [18] out here.

[19] I believe it's referring to [20] outwardly, or its goes to the aircraft.

[21] **Q:** The next part of Element C of Claim 4 of [22] the '194 patent says, " generating an integral [23] control signal in response to said variation in [24] said flow-related parameter, generating a

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[1] proportional signal in response to said variations [2] in said flow-related parameter."

[3] Is that met in the APS 3200?

[4] **A:** Yes, it is.

[5] **Q:** Can you show the jury where that is?

[6] **A:** This goes back to what I was saying [7] earlier, but what they're specifically breaking [8] out is we're taking this information here, but [9] we're only talking about passing it through this [10] portion, this dark blue portion, which is the [11] proportional portion of the analysis.

[12] **Q:** The next part of the claim — we may have [13] skipped —

[14] **A:** I believe there should be something about [15] integral controls. Did we move ahead?

[16] **Q:** Maybe we can go back to all of Claim C. [17] What I want to do is I'll point to it.

[18] **A:** Generating, yes.

[19] **Q:** Generating the integral — the next part [20] of Claim C of Claim 4 of the '194 patent was [21] generating an integral control signal in response [22] to said variation in said flow-related parameter. [23] It actually came in the claim before the [24] proportional signal.

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[1] You explained the proportional [2] signal. Is the part that I just read relating to [3] the integral signal present in the APS 3200?

[4] **A:** Yes, it is.

[5] **Q:** Can you show the jury where?

[6] **A:** It's — as I discussed earlier, this was

[7] a proportional portion in dark blue, the green [8] portion in parallel, simultaneously, this [9] integral, this integral portion which is where you [10] are generating an integral signal in response to [11] the flow-related parameter.

[12] **Q:** And the final, I think, part of Clause C, [13] we finally got to the end, is " simultaneously [14] utilizing said integral and proportional control [15] signals to operate said surge bleed valve."

[16] Is that present in the APS 3200?

[17] **A:** Yes, it is.

[18] **Q:** Can you show the jury where that is [19] present?

[20] **A:** Well, it gets, the proportional signal [21] and the integral signal get combined here and then [22] generates actually a control signal for the bleed [23] control valve.

[24] **Q:** I think we've now made it all the way

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[1] through Claim C and — or Clause C of Claim 4. [2] And to summarize, in your opinion, does the APS [3] 3200 surge control system meet all of the [4] different elements of Step C of Claim 4 of the [5] '194 patent?

[6] **A:** Yes, it does.

[7] **Q:** Now, let me turn to the final part of [8] Claim 4, which is Clause D.

[9] Clause D says, "adjusting the [10] relationship between the magnitude of said [11] integral and proportional control signals and the [12] magnitude of said parameter variations as a [13] function of the position of the inlet guide [14] vanes."

[15] Is that part of Claim 4 of the '194 [16] patent present in the APS 3200?

[17] **A:** Yes, it is.

[18] **Q:** Explain where, please.

[19] **A:** Well, this is the portion here, as I [20] indicated earlier, the IGV position. The IGV [21] position is used in the determination of where [22] the — of where the compressor is operating on the [23] flow curve that I referred to if it's operating in [24] the high flow region or in the low flow region.

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[1] When it's operating in the low flow [2] region, which means close to the area where surge [3] can occur, the proportional and integral — the [4] proportional and integral control portions are [5] functioning and the adjustment occurs when — I [6] should — I had forgotten to mention something to [7] you.

[8] It's very important because it ties [9] into what we're talking about here. I want to [10] take a small step back.

[11] **Q:** Okay.

[12] **A:** One thing I forgot to mention is it [13] refers to — what I forgot to mention was update [14] rate of ten milliseconds here, and the values [15] range between — I think in this particular case, [16] it's 10 to 40 milliseconds, which means what is [17] happening here is this calculation that I've shown [18] here, this instruction that goes out to the [19] control valve, it's not really continuous.

[20] It's not opening and closing a valve [21] on a water faucet. You open a bit and increase [22] and decrease it. It's not the way it works.

[23] Computers don't work that way. What [24] they do is they have to scan information. And

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[1] what they do, it's like polling — bad word these [2] days — but still, they have to scan around and [3] they actually, the computer will go and measure [4] pressure and temperature, then IGV position, and [5] it goes around and it makes all the calculations, [6] determines what the value should be, and then it [7] starts over again.

[8] And it does this continuously. In [9] fact, it does it from the moment the surge control [10] system or really when the engine is turned on, [11] when it's electrically turned on, it starts to do [12] it already.

[13] So it's doing it between 25,25 [14] and — 25 and a hundred times a second, 25 and a [15] hundred times a second. It's making this [16] calculation continuously, and it does it all the [17] time.

[18] It never stops doing it. While the [19] engine is on, the electrical system is on, it does [20] it on a continual basis.

[21] Now, having said that, what it's [22] doing when it gets to a high flow condition, when [23] it gets to a high flow condition, this computation [24] continues, continues, but since there is no chance

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[1] for surge flow to occur, it doesn't bother to use [2] this information any longer, and says all we need [3] is a fixed value now, because it's a high flow.

[4] There is no chance for error, so we [5] generate — so we generate a fixed signal of some [6] kind that keeps the valve fully opened going to [7] the aircraft. That's, basically, what it does.

[8] **Q:** Okay. And can you explain —

[9] **MR. ZIEGLER:** Your Honor, can I [10] just ask Mr. Putnam to record on the record where [11] the witness was moving his hand when he said, when [12] it gets to high flow conditions in this [13] computation?

[14] **THE WITNESS:** I believe it was [15] the — what I was referring to, Mr. Ziegler, is [16] that the come —

[17] **BY MR. PUTNAM:**

[18] **Q:** Let me respond to Mr. Ziegler's issue, [19] which I'm happy to do, and then — because I think [20] his issue was for me, not for the witness, which [21] was for the record, when Mr. Muller made the [22] statement that Mr. Ziegler referred to, he was [23] referring to the blue or the purple and dark green [24] portions of what we have marked as Plaintiffs'

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[1] Exhibit 954.

[2] Now, let me ask you, Mr. Muller, to [3] tie that language in Claim 4d. Show the jury, [4] please, how adjusting the relationship between the [5] magnitude of said integral and proportional [6] control signals and the magnitude of said [7] parameter variations as a function of the position [8] of the inlet guide vanes.

[9] **A:** Basically what it says there is for [10] varying flow, as I interpret it for varying flow, [11] the determination of where the proportional [12] integral controllers will impact is a function of [13] the IGV position, which will determine — which [14] will determine the actual — the actual [15] relationship of the proportional and integral [16] controller as it relates to the flow parameter, [17] which is measured — which is another way of [18] saying, a very long-winded way of saying it [19] determines — it basically — basically, adjusts [20] these values to accommodate for the fact that [21] there is a variation — that there is a part of [22] the flow control where it — there is no chance [23] for surge — part of the flow curve where there is [24] no chance for surge, and the lower part of the

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[1] flow curve, where there is the possibility of a [2] surge, referred to as high and low flow.

[3] **Q:** Is that a function of the position of the [4] inlet guide vanes?

[5] **A:** Yes, it is.

[6] **Q:** Where in the testimony is that shown?

[7] **A:** That's shown right here.

[8] **Q:** And for the record, you have up what [9] we've marked for identification as PTX 955; is [10] that right?

[11] **A:** Yes, it is.

[12] And your question, sir?

[13] **Q:** Where on PTX Exhibit 955 is the position [14] of the inlet guide vane function in?

[15] **A:** This is shown here as the input, as the [16] input in determining in the overall function [17] and — it's used as part of the logic which [18] determines —

which determines when the — where [19] we are on this curve, high or low flow.

[20] **Q:** Okay. Let me now ask Mr. Schlaifer to [21] put up all of Claim 4, and ask you now that we've [22] walked through each and every step, each and every [23] word of Claim 4 of Honeywell's '194 patent, is it [24] your opinion that Sundstrand's APS 3200 surge

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[1] control system literally infringes that patent?

[2] **A:** I believe so.

[3] **Q:** Now, let me turn to the Honeywell '893 [4] patent. And I think the pace will pick up a [5] little because a lot of the concepts will be [6] familiar.

[7] Let me ask Mr. Schlaifer to first [8] put up Claim 8 of the '893 patent.

[9] Okay. Again, we'll blow up the [10] language of the claims so that it's easier for the [11] jury to see as we go through it.

[12] I see here paragraphs where [13] Sundstrand admits yes, I also see paragraphs where [14] it says Sundstrand's expert admits yes. What's [15] that about?

[16] **A:** My understanding is that Sundstrand's [17] expert, in depositions that he participated in, [18] expressed a view which, in effect, admitted that [19] the — that that particular section here, Claim [20] 8c, and Claim 8e, in fact, Sundstrand did infringe [21] on them per the expert's statements.

[22] **Q:** Okay. And when you refer to the [23] Sundstrand expert statement, you're referring to [24] Mr. Shinskey; is that right?

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[1] **A:** Yes.

[2] **Q:** Let me just, for the record, identify [3] Plaintiffs' Exhibit 873. I'm not going to ask you [4] any substantive questions other than: Is what's [5] in the chart that you recall in connection with [6] the admission that you just referred to?

[7] **A:** Yes, it is.

[8] **Q:** And was it your recollection — you were [9] at Mr. Shinskey's deposition; is that right?

[10] **A:** Yes, I was.

[11] **Q:** And was it your recollection that [12] Mr. Shinskey indicated that the parts of the [13] claims that were in bold type in this Exhibit 873 [14] were the ones he was contesting, and the parts of [15] the claim that were in standard type were the ones [16] that he conceded were present in the APS 3200?

[17] **A:** That was my recollection, yes.

[18] **Q:** Okay. Let's walk through Claim 8, and as [19] I said, I think we'll be able to do it a little [20] bit more quickly, given that we have some similar [21] concepts. But we've got to do it step by step.

[22] Let me start with the top of Claim [23] 8, the first part of Claim 8 of the '893 patent. [24] I suppose I should ask you the overall question,

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[1] first.

[2] Do you have an opinion as to whether [3] the APS 3200 surge control system infringes [4] Claim 8 of Honeywell's '893 patent?

[5] **A:** Yes, I do.

[6] **Q:** What is that opinion?

[7] **A:** I believe that in that particular — in [8] that particular — are you asking me of the [9] element or Claim 8?

[10] **Q:** Claim 8, yes.

[11] **A:** As far as the claim, I believe it's [12] equivalent — on the basis of equivalents, it does [13] infringe on — that Element 8 — that Sundstrand [14] infringes on Element 8, yes.

[15] **Q:** I got you tangled up there. Let me start [16] the question over again.

[17] **A:** Yes.

[18] **Q:** What is your opinion with regard to [19] Claim 8 of Honeywell's '893 patent and the [20] Sundstrand APS 3200?

[21] **A:** Well, my opinion is that Sundstrand, in [22] fact, infringes on Claim 8.

[23] **Q:** Is that infringement literal or under the [24] Doctrine of Equivalents?

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[1] **A:** On certain aspects, the literal basis, [2] and certain elements, it's based on equivalents.

[3] **Q:** Okay. With that background, let me now [4] walk us through each part of Claim 8.

[5] The top of Claim 8 reads, "a gas [6] turbine engine accessory power unit having a [7] fluctuating compressed air supply demand, said [8] accessory power unit comprising."

[9] That's one I note Sundstrand admits [10] yes to. Does the APS 3200 meet that part of [11] Claim 8, in your opinion?

[12] **A:** Yes, it does. And as indicated earlier, [13] this is the gas turbine portion. And the [14] compressed air supply, after having a fluctuating [15] compressed air supply depending on what the [16] aircraft is demanding.

[17] **Q:** The next part of Claim 8 which Sundstrand [18] also admits is "a compressor having adjustable [19] inlet guide vanes."

[20] Does the APS 3200 meet that part of [21] the claim?

[22] **A:** Yes, it does. They're shown here.

[23] **Q:** And for the record you have Honeywell PTX [24] 952 in front of the jury; is that correct?

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[1] **A:** That is correct.

[2] **Q:** The next part of Claim 8 reads, " duct [3] means for receiving compressed air discharged from [4] said compressor and supplying the received air to [5] the pneumatically-powered apparatus."

[6] Again, that's one that Sundstrand [7] admits. Can you show where on PTX 952 that is [8] indicated?

[9] **A:** Yes. This is the duct portion that that [10] refers to.

[11] **Q:** Okay. The next part of Claim 8 of the [12] '893 patent, Part C reads, "surge bleed means [13] operable to exhaust from said duct means a [14] selectively variable quantity of air to assure at [15] least a predetermined minimum flow rate through [16] said duct means and thereby prevent surge of said [17] compressor."

[18] Is that present in the APS 3200?

[19] **A:** Yes, it is.

[20] **Q:** Can you show where?

[21] **A:** It refers to the bleed control valve [22] which can divert flow back and forth between the [23] aircraft and the exhaust.

[24] **Q:** The next part of Claim 8 of Honeywell's

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[1] '893 patent reads, "sensing means or sensing the [2] value of a predetermined, flow-related parameter [3] within said duct means and generating an output [4] signal indicative of said value, said value of [5] said flow-related parameter being substantially [6] independent of the temperature of the compressed [7] air."

[8] Is that met in the Sundstrand [9] APS 3200?

[10] **A:** Yes, it is.

[11] **Q:** Can you explain why, please?

[12] **A:** At the — in the duct itself, if you [13] recall, I mentioned that they measure a pressure [14] at the discharge of the compressor itself, that is [15] measured in the duct portion of the compressor at [16] the discharge where the output — the discharge is [17] part of the duct of the compressor.

[18] And let's see. What more does it [19] say?

[20] Sensing means is the actual pressure [21] sensor, where there is a hole in the duct. So [22] there's a pressure device screwed into it, and [23] it's also in communication with whatever the air [24] is in the duct. And that's the sensing means, I

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[1] believe, that that's referred to.

[2] For sensing a value of predetermined [3] flow-related parameter within said duct means, [4] that sensing value is used in the flow parameter, [5] which I showed you earlier, that sensing means [6] refers to this value here, this is the pressure [7] means value for the generation of this term, which [8] is a function of flow.

[9] **Q:** Let me just stop you, this value here, [10] you're referring to PS on —

[11] **A:** It's on PTX 954.

[12] **Q:** And then this value here, which was a [13] function of flow, you were circling the DELPQP?

[14] **A:** That's correct. I'm sorry if I went a [15] bit too fast there.

[16] **Q:** No. I want to make sure the court [17] reporters have a record of what's happening.

[18] **A:** Yes. I was referring to what is called [19] DELPQP which is a — which is a value which is [20] generated from delta P divided by PS, the [21] discharge pressure measured, which is referred to [22] here as a sensing means.

[23] **Q:** Okay. And the last part of Claim D, [24] Part D of Claim 8 says "said value of said

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[1] flow-related parameter being substantially [2] independent of the temperature of the compressed [3] air.

[4] Is that part also met by the APS [5] 3200?

[6] **A:** Yes, the value of the pressure measured [7] here — sorry. The value, the value of the [8] pressure measured here is independent of [9] temperature.

[10] **Q:** And when you say "here", you're pointing [11] to what I think you have identified as the duct [12] flow, the bleed control valve on PTX 952?

[13] **A:** Yes, it's the general area around the [14] discharge of the compressor.

[15] **Q:** Okay. The next part of Claim 8 reads, [16] "compare for means for receiving said sensing [17] means output signal and generating an error signal [18] representing the difference between the incensed [19] value of said parameter and a desired value [20] thereof, said comparator means having an [21] adjustable control set point representing said [22] desired value of said parameter."

[23] **A:** Yes.

[24] **Q:** Is that met by the APS 3200?

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[1] **A:** Yes, it is. And this is the comparator [2] that it's referring to in this particular case. [3] And what it's measuring here is the said [4] parameter, I believe is the flow parameter, and it [5] is comparing it against the point here and — and [6] this is — and this is where the comparing [7] function occurs.

[8] **Q:** I think on the demonstrative we have left [9] off one word. The word parameter was in the end [10] of the claim.

[11] **A:** Yes.

[12] **Q:** I take it the said parameter is the rest [13] of Claim E?

[14] **A:** As I recall, that was the same set [15] parameter as said earlier in that sentence, yes.

[16] **Q:** The text part of Claim 8 reads, " means [17] for transmitting to said comparator means a reset [18] signal for varying said set point as a function of [19] the position of said inlet guide vanes in [20] accordance with a predetermined reset schedule."

[21] Let me ask you if you believe that [22] part of Claim 8 is met either literally or [23] equivalently by the APS 3200 surge control system?

[24] **A:** I believe that's met equivalently.

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[1] **Q:** Okay. And can you explain to the jury [2] the basis for that opinion?

[3] **A:** Well, it says means for transmitting to [4] said comparator a reset signal for varying said [5] set point as a function of the position of said [6] inlet guide vanes.

[7] Well, a means is a device which is [8] mounted right on the inlet guide vane and as it [9] rotates, it generates a value which is a [10] percentage of it opening and closing. And that's [11] what it refers to as the means.

[12] And then a means for transmitting [13] said comparator means for a said — I'm sorry. I [14] should speak more slowly. And that value is then [15] in turn — and that inlet vane, vane position is [16] then, in turn — then, in turn, is used in this [17] equivalent comparator for setting a high or low [18] flow.

[19] **Q:** When you say this equivalent comparator, [20] you're referring to the BLDSEL thing?

[21] **A:** Referring to the area just prior, the [22] actual generation, the actual item which generates [23] the BLD select signal.

[24] **Q:** Let me ask you, in your opinion, what is

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[1] the function being served in Claim 8 of the '893 [2] patent by the claim term of means for transmitting [3] to said comparator means a reset signal, et [4] cetera?

[5] What's the function of Part F of [6] Claim 8?

[7] **A:** Well, I believe I might have mentioned [8] that earlier. If I didn't, I thought I had.

[9] It was the actual — I believe it [10] was the generation of the signal that — the means [11] are the — the means are the actual device on the [12] IGV, which is — that is the means for [13] transmitting the value to the said comparator, [14] yes.

[15] **Q:** Okay. Let me ask you to take a step back [16] and ask what is the function that is being served [17] in the patented system by Step 8 of Claim 8 of [18] the — Step F of Claim 8 of the '893 patent?

[19] **A:** What it serves to do is to determine, is [20] to establish for the surge control system and tell [21] it when it's in high or low flow.

[22] **Q:** Okay. And what is the function in the [23] APS 3200 of the measurement?

[24] **A:** The function in the APS 3200 of the

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[1] measurement is to determine — is to — it [2] utilizes this information to — in relationship —[3] in order to tell the surge control system, to tell [4] the surge control system when — when — in order [5] as part of the surge control to tell it when it is [6] operating in high flow, and when it is operating [7] in low flow.

[8] **Q:** And what is the way that the patent — [9] Claim 8f, what is the way that it uses that [10] information to serve that function?

[11] **A:** It uses the function to make a [12] determination — that's how you — which then is [13] used in — it goes back to our earlier chart.

[14] **Q:** And you're putting up now PTX 953?

[15] **A:** Yes, I believe that's what it is.

[16] This goes back to what we talked [17] about earlier, where basically the actual, the [18] actual flow and the generation of this BCV control [19] signal, the IGV position is then used to actually [20] determine, as I just indicated, when it's in high [21] or low flow, which eventually generates the actual [22] control signal for the bleed control valve.

[23] **Q:** What is the result of the patents used in [24] Claim F of the inlet guide vane position?

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[1] **A:** It is used in the control of the surge [2] control system.

[3] **Q:** Do you have an opinion as to whether the [4] function, way and result of Claim 8f is identical [5] to the function, way and result of the use of the [6] inlet guide vane position in the APS 3200 surge [7] control system?

[8] **A:** Yes.

[9] **Q:** And what is that opinion?

[10] **A:** Yeah, I believe it's equivalent to it. [11] Yes.

[12] **Q:** Now, let me ask you to go to the next [13] part of Claim 8, or to put up — and I guess we [14] have got two parts left that Sundstrand admits.

[15] The next one is "control means for [16] receiving said error signal and transmitting to [17] said surge bleed means a control signal to operate [18] said surge bleed means, the magnitude of said [19] control signal having, relative to the magnitude [20] of said error signal, a proportional component and [21] an integral component."

[22] Is that met in the APS 3200?

[23] **A:** Yes. Yes it is.

[24] And it's met in this chart again,

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[1] working it through item by item. We refer, again, [2] to the pressure value, the flow parameter value, [3] which compares it against a set point which [4] generates an error. There is an error signal [5] indicated here which then — and then it goes [6] through the proportional and integral controller, [7] which eventually results in the control of the [8] bleed control valve.

[9] **Q:** Okay. And the final part of Claim 8 of [10] the '893 patent reads, "whereby said minimum flow [11] rate through said duct means is essentially [12] constant regardless of the compressed air supply [13] demand of the pneumatically-powered apparatus."

[14] Can I ask you whether that is [15] present in the APS 3200 surge control system?

[16] **A:** Yes, it is.

[17] **Q:** Can you show where that is present?

[18] **A:** As in other claims, it's present in this [19] portion here, where the minimum no rate is [20] maintained by use of this valve to — by [21] altered — by moving the air to the aircraft and [22] to the exhaust in equal portions that are such [23] that you maintain a constant flow going through [24] the compressor.

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[1] **MR. PUTNAM:** And let me ask [2] Mr. Schlaifer to turn to all of Claim 8.

[3] **BY MR. PUTNAM:**

[4] **Q:** Now that we've gone through each part of [5] Claim 8, do you have — let me just ask you again [6] to state your opinion on whether Claim 8 of [7] Honeywell's '893 patent is met by the Sundstrand [8] APS 3200 surge control system?

[9] **A:** Yes.

[10] **Q:** Now, let me turn to the next claim, which [11] is in dispute in this case, and that is Claim 10 [12] of the '893 patent.

[13] Claim 10 looks to be a little bit [14] shorter than Claim 8, because as the jury would [15] see if they looked at the actual patents in the [16] book, this is the full length of Claim 10.

[17] Claim 10 reads, "the accessory power [18] unit of Claim 8 wherein said control means include [19] parallel proportional and integral controllers [20] coupled to a summer having an outlet connected to [21] said surge bleed means."

[22] First of all let me ask you about [23] the form of the claim there. There is a reference [24] at the start of Claim 10 to Claim 8. What's that

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[1] about?

[2] **A:** Well, what I understand that to mean is [3] that Claim 10, everything in Claim 8 is — Claim 8 [4] is part of Claim 10.

[5] **Q:** So is it your understanding that [6] Claim 8 — Claim 10 includes everything in Claim 8 [7] and then an additional element?

[8] **A:** Yes.

[9] **Q:** And I think there may have been a [10] reference to something earlier called a dependent [11] patent claim.

[12] Is it your understanding that [13] Claim 10 is an example of a dependent patent [14] claim?

[15] **A:** That's what I understand.

[16] **Q:** And just for the terminology, it is [17] dependent on Claim 8; is that your understanding?

[18] **A:** That's what that term implies.

[19] **Q:** Now, we already did Claim 8, so I just [20] want to focus here on your opinion on Claim 8 [21] itself.

[22] Let me just focus here on the new [23] material that is added by Claim 10, which is, [24] "wherein said control means include parallel

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[1] proportional and integral controllers coupled to a [2] summer having an outlet connected to said surge [3] bleed means."

[4] Is that present on the APS 3200?

[5] **A:** Yes, it is.

[6] **Q:** And can you show the jury where that's [7] present?

[8] **A:** It's present here and here. I believe [9] the difference earlier is that it referred to [10] these individually, and here it's basically saying [11] that they are coupled in parallel, which is what [12] these black lines are showing, which then goes to [13] a summer, where they are sum, and that generates [14] the surge, the surge bleed means which is shown [15] here.

[16] **Q:** Okay. The next part of Claim 10 — I'm [17] sorry, the next patent claim at issue is Claim 11 [18] of Honeywell's '893 patent. And let me ask [19] Mr. Schlaifer to put that up on the board.

[20] Claim 11 of the '893 patent reads, [21] "the accessory power unit of Claim 8 wherein said [22] sensing means include at least one [23] pressure-to-electric transducer, and said [24] comparator means and said control means comprise

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[1] electronic components."

[2] Again, this is a — let me ask you [3] this question. In your opinion, is this claim met [4] by the APS 3200 surge control system?

[5] **A:** Yes, it is.

[6] **Q:** Again, it's dependent on Claim 8; is that [7] your understanding?

[8] **A:** That's my understanding as before.

[9] **Q:** And we've already dealt with your opinion [10] on Claim 8, and its infringement, so let me [11] address the new part added by Claim 11.

[12] The new part added by Claim 11 reads [13] "wherein said sensing means include at least one [14] pressure-to-electric transducer and said [15] comparator means and said control means comprise [16] electronic components."

[17] Why is that present in the APS 3200?

[18] **A:** Well, as indicated earlier, the pressure [19] sensors, the pressure sensor is actually a devised [20] which is screwed into the duct itself, the [21] discharge as one example, where it takes the [22] pressure reading.

[23] It then converts that pressure [24] reading into an electrical signal which can be

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[1] used within the computer, because computers can [2] only use electrical signal. So that's one example [3] of it.

[4] And as far as the remainder of it, [5] this as I indicated before, all of this is done [6] electronically. And in fact, the actual document [7] itself is referred to as — make sure I get the [8] terminology right, the electrical control box.

[9] **Q:** Okay. That takes care of Claim 11 of [10] Honeywell's '893 patent.

[11] We have two patent claims left that [12] are at issue, Claims 19 and 23. I wonder, Your [13] Honor, if I could have a brief side-bar with you [14] before we proceed to those claim terms.

[15] (Beginning of side-bar conference.)

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[1] **MR. PUTNAM:** Your Honor, [2] Mr. Muller, the reason for the side-bar, I [3] apologize for this, is to see if we can take the [4] lunch break fifteen minutes ear-

lier.

Mr. Muller has been on his feet all day. I don't know if he's hypoglycemic. When we have been working with him, we have to feed him lunch early because he starts losing energy. It's important stuff, so with your permission, I would like to end fifteen minutes early.

(Conclusion of side-bar conference.)

THE COURT: We're going to take our luncheon recess a bit early today. We will break now and return at two p.m.

See you then.

MR. PUTNAM: Thank you, Your Honor.

(A brief recess was taken.)

THE COURT: Counsel please be seated.

MR. KRUPKA: Your Honor, two housekeeping matters that I just wanted to mention to the Court before you reviewed some things over the lunch hour.

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In view of Your Honor's ruling this morning with respect to the deposition designations that we were hoping to read later this afternoon, about which there is still some dispute, I just wanted to mention that I believe it's true that Mr. Van Santen, who is one of the deposition designations in dispute, will be a live witness.

THE COURT: Well, I'm glad you raised that issue because I had intended to address the substance of the letters of February 6th.

MR. KRUPKA: Okay.

MR. ZIEGLER: Just before you rely on what Mr. Krupka said —

THE COURT: Whether he is or whether he's not, it doesn't matter.

MR. ZIEGLER: Okay.

THE COURT: What the Court has before it are Honeywell's objections to Sundstrand's objections to certain deposition designations. And I guess what I'm going to do is sustain Honeywell's objections to the objections.

MR. KRUPKA: Thank you, Your Honor.

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THE COURT: As a matter of form. There will be — it is the core's view that these are issues of weight, and not questions of admissibility. And that you, Hamilton, have ample opportunity through argument and cross-examination to refute the contentions, direct or indirect, that Hamilton seeks to have the inferences that Hamilton seeks to have drawn specifically, for instance, through the testimony of the designations of Mr. Van Santen.

And that's the Court's ruling.

MR. KRUPKA: Your Honor, just one other point of clarification. Since this is my first trial before this Court, I just want to make sure that I am complying with the Court's wishes with respect to how things are conducted.

It was my understanding that one lawyer deals with each witness, one lawyer for each side, and that we don't have a tag team. I was a little surprised to hear Mr. Ziegler interpose an objection during Mr. Muller's testimony, because I had thought that it was Mr. Herrington who had made previous objections.

And I just would like to have a

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clarification to that for future reference.

THE COURT: That's a fair point and that is a point that we didn't go over earlier, so there was nothing improper that was done. It is the Court's preference that one lawyer handle a witness.

MR. ZIEGLER: Your Honor, just to explain, I actually didn't object, I simply asked that the record be clarified to show where the witness had put his hand on the chart.

Mr. Herrington was seated at the counsel table, only I was standing to the side and saw what was going on.

THE COURT: I think your opponent took it as objection, I understand the clarification, I hope the clarification has she had.

MR. KRUPKA: Thank you, Your Honor.

THE COURT: Anything else we need to discuss before we adjourn to take lunch?

MR. KRUPKA: I don't think so, Your Honor.

THE COURT: See you back at 2:00.

(A brief recess was taken.)

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THE COURT: Good afternoon.

MR. KRUPKA: Good afternoon.

THE COURT: We're ready.

MR. KRUPKA: Your Honor, if I may just hand to Ms. Preston some additions to the juror notebook that will be necessary before the depositions are shown. There is two — there is request for admissions that Exhibit 2.

(Jury entering the courtroom at 2:00 p.m.)

THE COURT: Good afternoon, members of the jury. Are you all ready to go? Okay.

THE CLERK: Mr. Muller, you're still under oath. You may resume the stand.

THE COURT: Mr. Putnam.

MR. PUTNAM: Thank you, Your Honor.

BY MR. PUTNAM:

Q: Mr. Muller, why don't you stay off the stand because I think we are going to do a little bit more of what we were doing.

Before lunch we went through your opinions on literal infringement of Claim 4 of the '194 patent and infringement under the doctrine

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of equivalence on Claims 8, 10 and 11 of the '893 patent and that left two patent claims that are at issue in this case that we didn't have a chance to go through, through lunch.

I think we'll see some familiar concepts. I don't know how long it will take, but we need to go through those.

Let me ask you about Claim 19 of the '893 patent and ask Mr. Schlaifer to put it up.

Mr. Muller, have you formed an opinion on whether the surge control system used by the APS 3200 infringes claim 19 of the '893 patent?

A: Yes, I have.

Q: And what is that opinion?

A: And that opinion is that it does infringe, yes.

Q: And is that infringement literal or under the doctrine of equivalence in your view for this claim 19?

A: I believe it's under the doctrine of equivalence.

Q: Again, let me ask you to walk through each step of the claim, starting with the first

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part. And the first part of claim 19 reads, "A control system for assuring a substantially constant minimum flow rate through a duct receiving air discharged from a compressor or the like having adjustable inlet guide vanes.

Why don't you put up whatever chart you want to.

A: I'm putting up Honeywell PTX 952.

Q: And can you — I take it from your earlier answer that you believe that the 3200 does meet this part of Claim 19; is that correct?

A: Yes, it does.

Q: And can you show where that is,

please?

A: As in the prior case as similarly, the actual constant minimum flow is determined at the discharge of the load compressor.

The duct receiving is what is shown here, has been shown throughout receiving air discharged from a compressor or the like having adjustable inlet guide vanes and that refers to this compressor which was adjustable guide vanes.

Q: The next part of claim 19 of the '893 patent reads, "The duct having a supply outlet connect to do a pneumatically-operated apparatus

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having a variable supply air demand, the duct further having an exhaust outlet, said control system comprising."

Is that part present in the APS 3200?

A: Yes, it is.

Q: Can you tell the jury, please?

A: Yes. The duct it's referring to is here of course which we did previously, which is the duct having the supply outlet connected to a pneumatically operated apparatus having a variable supply air demand, that referring to the aircraft environmental control system.

The duct further having an exhaust outlet which generally constitutes this portion as well.

Q: Okay. The next part of Claim 19 of the '893 patent, I see is one that Sundstrand expert admits yeses on is, " A flow regulating device adapted to be positioned enter the exhaust outlet and operable to selectively vary air flow outwardly there through." Is that present in the claim?

A: Yes.

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Q: The next part of claim 19 reads, "a sensing device having a sensing portion adapted to be positioned in the duct to sense therein a predetermined parameter related to the air flow rate through the duct, said sensing device further having an output portion."

Is that present in the APS 3200?

A: Yes, it is.

Q: Can you show where, please, it is?

A: As I indicated earlier, in the discharge portion of the compressor where a pressure sensor is utilized in order to measure a parameter, which is associated with the flow rate.

Q: Okay. The next portion of Claim 19 reads, "An adjustable set point comparator having an input portion couple to said output portion of said sensing device, and an outlet adapted to generate an error signal."

Is that present in the APS 3200 system?

A: Yes, it is. And that's illustrated on Honeywell PTX 954. Let's just go through that a moment. An adjustable set point comparator which refers to this, this signifies a comparator.

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The adjustable set point arrives from SRGSPT, coupled to output portion of said sensing device, this is the output portion of the said sensing device which is the change in pressure over pressure which measures flow and an outlet adapted to generate an error signal, and here is the error signal emanating from the comparator.

Q: The next portion reads, a proportional controller having an inlet coupled to said output of said comparator and further having an outlet."

Is that present in the APS 3200?

A: Yes. And all that is saying is that continuing on, that this connects to the proportional controller and that in turn has an outlet as well, it comes out through here.

Q: Okay. The next part of Claim 19 of the '893 patent reads, "An integral controller having an inlet coupled to said outlet of said comparator and further having an outlet."

Is that present in the APS 3200?

A: Yes, it is. It is in the same way that the proportional controller was the integral controller, also has the inlet coupled to the set

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comparator, and it also has an outlet as well.

Q: Okay. The next part of Claim 19 of the '893 patent, part F says, "A summer having a first inlet coupled to said outlet of said proportional controller, a second inlet coupled to said outlet of said integral controller, and an outlet coupled to said flow regulating device."

Is that present in the APS 3200?

A: Yes, it is.

Q: Can you show the jury where it is?

A: And that basically completes the thought of where the outlet here, the outlet from the integral controller and the outlet from the proportional controller complete a summer, sums both signals to generate one signal and that's what "coupled" really means.

And then it goes off to direct the flow regulating device which is the signal generated here, this is the BCVCTL. It's a signal that goes to the bleed control valve to regulate it.

Q: The final part of Claim 19 of the '893 patent reads, "A guide vane position sensor and a function generator coupled in series between the

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inlet guide vanes and said input portion of said comparator."

In your opinion, is that portion of Claim 19 present in the APS 3200?

A: Yes, it is.

Q: And is it your opinion that that is literally present or present by the doctrine of equivalence?

A: I believe it's present by the doctrine of equivalence.

Q: Can you show, please, the jury, the basis for that belief, that opinion?

A: I'm placing Honeywell PTX 955 up for illustration.

And basically here this is illustrated by the measurement of the IGV position, the guide vane position sensor is here. This is the function generator that it goes through, and it's between inlet guide vanes and the inlet portion to a said comparator and here is the said comparator.

Q: What is the function that is being served by the guide vane position sensor and the rest of clause G of Claim 19 of the '893 patent?

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A: The function is to identify a guide vane position in order to help in the control of the surge control system.

Q: What is the function of the inlet guide vane position sensor and the other elements that you've identified to the chart that we've labeled plaintiffs Exhibit 955?

A: The purpose here is to measure the guide vane position in order to help to, as input to the surge control system.

Q: What is the way in which the sensor in Claim 19 G works?

A: The sensor in 19 G, the sensor, the sensor on the — the sensor on the Honeywell — I'm sorry, the sensor on the patent. — The sensor on the patent refers to a device which I've referred to earlier which is at the end of the inlet guide vane which measures the position and generates a signal which is relative to the position of the guide vane.

Q: Okay. And how does the guide vane position sensor and the other elements in the APS 3200 work? What is the way in which they work in the APS 3200?

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[1] **A:** On the APS 3200, the vane position is [2] measured in the same way. As the vane position [3] moves, there is a device which determines its [4] position and generates a signal proportional to [5] the signal of the guide vane.

[6] **Q:** And what's the result in the patent of [7] the use of this guide vane position sensor that's [8] called out in Claim 19 G?

[9] **A:** The — it is used in the operation of the [10] surge control system.

[11] **Q:** Okay. And what's the result of the guide [12] vane position sensor that is shown in the Hamilton [13] Sundstrand APS 3200 system?

[14] **A:** It's the same thing, the value of the IGV [15] position is used in the proper operation of the [16] surge control system.

[17] **Q:** Mr. Schlaifer if you can go to the final [18] screen on Claim 19. Now, that we've gone through [19] all of Claim 19, let me ask you for the record to [20] restate, now that we've seen it all, what is your [21] opinion on whether the Hamilton Sundstrand APS [22] 3200 infringes Claim 19 of the '893 patent?

[23] **A:** I believe it does infringe.

[24] **Q:** Finally for the patent claims, let me

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[1] turn to Claim 23 of the '893 patent. A welcomed [2] relief in terms of its length. It says "The [3] control system of Claim 19 wherein said control [4] system is electronic."

[5] First of all, is this another one of [6] those dependent claims that we saw earlier?

[7] **A:** Yes, as I indicated earlier, this is [8] another dependent claim.

[9] **Q:** So I think what you said earlier was this [10] incorporates all of the limitations, all of the [11] different elements of Claim 19 that we were just [12] looking at and then adds one additional element; [13] correct?

[14] **A:** Yes. The same thing is done here as was [15] done in the former claims wherein there was a [16] dependent claim based on a claim that was [17] mentioned in the actual claim itself.

[18] **Q:** Okay. Well, we've already covered all [19] the parts of Claim 19, that's what we just did. [20] Let me ask you about this new part added by claim [21] 23. Wherein said control system is electronic. [22] Is that met by the APS 3200?

[23] **A:** Yes, it certainly is. The entire [24] operation of the APS 3200 is based on electronic

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[1] instruments, or concepts, concepts and logics and [2] devices.

[3] **Q:** I'm now taking you through your opinions [4] on doctrine of equivalence under the '893 patent. [5] I want to return, if I can, to Claim 4 of the '194 [6] patent.

[7] And you previously testified to your [8] opinion that Claim 4 of the '194 patent was [9] literally infringed; is that correct?

[10] **A:** That's correct.

[11] **Q:** All right. Now, let me ask you this [12] question, Mr. Muller. If it was determined that [13] Clause D of Claim 4, if this clause, Clause D, was [14] not literally present in the APS 3200, would you [15] have an opinion as to whether this clause, this [16] part was present by the doctrine of equivalence in [17] the APS 3200?

[18] **A:** Well, as I said, yes, the answer — yes, [19] I would.

[20] **Q:** And what would the opinion be, sir?

[21] **A:** And my opinion would be as it was [22] formally, that if I believe that this was in fact [23] a literal infringement, and for some reason it [24] should be shown not to satisfy the strict, the

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[1] strict interpretation of what a — an allege [2] infringement is, by my logic, by my reasoning it [3] would certainly infringe on the basis of [4] equivalence.

[5] **Q:** What is the function of this adjustment, [6] just of the relationship that is called out in [7] Clause D of Claim 4 of the patent?

[8] **A:** The function of that is to aid in the [9] operation, is to allow the proper operation of the [10] surge control system.

[11] **Q:** Okay. And what is the function of the [12] relationship between the control signals and the [13] parameter variations as a function of the guide [14] vane positions in the APS 3200?

[15] **A:** The function there is in order to [16] establish if the APS 3200 is operating under a [17] high flow condition or a low flow condition.

[18] **Q:** And what is the way in which the APS 32 [19] — what is the way in which Claim 4 of the '194 [20] patent adjusts that relationship?

[21] **A:** It adjusts that relationship as was [22] formally shown — it adjusts — the relationship, [23] this relationship here, this relationship here, [24] which is the proportional and the integral

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[1] portion, this relationship here is adjusted by the [2] IGV position in such a way that it determines — [3] that that it determines — it determines if the [4] compressor is operating under high or low flow [5] condition.

[6] **Q:** And what is the result of the adjustment [7] of the relationship of the magnitudes set forth in [8] Claim 4 D of the '194 patent?

[9] **A:** The result of it is to, as I said [10] earlier, basically, it's to allow the surge [11] control system to properly operate from the [12] standpoint of that it provides it with an ability [13] to control the — to control the compressor when [14] it is operating in an area where surge is [15] possible, and also at the same time when the [16] compressor is in a high flow rate, at the help in [17] determining when it's in the high flow regime [18] where no surge is possible.

[19] **Q:** Is that the same result as occurs at the [20] APS 3200 surge control system?

[21] **A:** Yes.

[22] **Q:** Thank you. Why don't you go ahead and [23] resume the stand now. And I guess just let me ask [24] the final question having gone through that. —

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[1] Why don't you resume the stand.

[2] So in summary, is it your opinion [3] that to the extent that it's determined that Claim [4] 4 of the '194 patent is not literally infringed [5] that there would still be infringement under the [6] doctrine of equivalence?

[7] **A:** Yes, for the reasons I cited earlier.

[8] **Q:** Thank you.

[9] There has been some mention of this [10] issue of temperature. Does the APS 3200 measure [11] temperature?

[12] **A:** Yes, it measures temperature among the [13] whole series of other measurements such as [14] pressure, pressure IGV and so on.

[15] **Q:** Does that measurement affect your opinion [16] as to whether there is infringement of the [17] Honeywell patent as we've just gone through?

[18] **A:** No.

[19] **Q:** Why not?

[20] **A:** Well, because the Honeywell patent, and [21] the APS 3200 both, or the APS 3200 measures the [22] same things that are measured by the Honeywell [23] patent. The fact that it may measure other things [24] as well is perfectly — is perfectly reasonable,

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[1] but as long as it measures the same things as are [2] measured in the Honeywell patent, my understanding [3] is that that means, in fact, it is infringing.

[4] **MR. PUTNAM:** Thank you, Your [5] Honor. No further questions.

[6] **THE COURT:** Mr. Herrington, you may

[7] cross-examine.

[8] **MR. HERRINGTON:** Thank you, Your [9] Honor. Could we have the Claim 4 brought back up [10] that Mr. Muller was just talking about?

[11] Your Honor, if I may ask Mr. Muller [12] to step down so we can review some of these charts [13] that we have been looking at.

[14] **THE COURT:** Certainly.

[15] **MR. HERRINGTON:** Thank you.

[16] **MR. PUTNAM:** Your Honor, do you [17] mind if I stand back there in order to see?

[18] **THE COURT:** That's fine.

[19] **MR. PUTNAM:** If Your Honor doesn't [20] mind, I suspect Mr. Herrington wont mind.

[21] **MR. HERRINGTON:** Not at all [22] CROSS-EXAMINATION [23] BY MR. HERRINGTON:

[24] **Q:** So, Mr. Muller, you understand that

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[1] element D requires adjusting the relationship [2] between the magnitude of said integral and [3] proportional control signals and the magnitude of [4] said proportional control signals as a management [5] function of the inlet guide vanes?

[6] **A:** Yes.

[7] **Q:** You said that occurs in the 3200 in that [8] in the guide vane position affects whether this [9] bleed select signal is zero or one?

[10] **A:** That's right.

[11] **Q:** So is it the switching between zero and [12] one that adjusts the relationship between the [13] magnitudes of said integral and proportional [14] control signals and the magnitudes of said [15] parameter variations?

[16] **A:** That's not the way I think of it. The [17] way I think of it is that it is basically what is [18] being done here, is that the proportional and [19] integral control signals are being continuously [20] generated. And they get generated regardless if [21] the compressor is in high or low flow.

[22] But where the IGV position is used [23] here is that because of the characteristics of the [24] APS 3200, it has an additional step, and — what

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[1] it does is it establishes a fixed position for the [2] bleed control valve under a high flow condition.

[3] Nevertheless, the proportional — [4] and the proportional integral control signals [5] continue to be generated but now what you have [6] done is you have changed the magnitudes of those [7] as far as the surge control system is as [8] established by the position of the IGV's.

[9] **Q:** In your understanding, the test that uses [10] IGV position changes the magnitudes of the PI [11] signal?

[12] **A:** As far as the surge control system [13] operates and as far as I understand it.

[14] **Q:** So it has a different magnitude depending [15] on the IGV position?

[16] **A:** As far as the bleed control valve is [17] concerned, yes.

[18] **Q:** And that's the understanding of the facts [19] that you have been using in doing your analysis?

[20] **A:** The explanation I just gave I think is [21] consistent with what I have said throughout the [22] morning and part of this afternoon.

[23] **Q:** Very good.

[24] Now, Mr. Muller, again, IGV position

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[1] has an affect on whether this bleed select signal [2] is zero or one; is that correct?

[3] **A:** Yes, that's correct.

[4] **Q:** And all of the things you've said about [5] what happens in the 3200 with respect to IGV [6] position and how it satisfies the patent claims, [7] that goes to IGV position changing the signal [8] between zero and one?

[9] **A:** No. It actually has to do with the fact [10] that as far as the proportional and integral, the [11] magnitude of those and as they impact on the bleed [12] control valve. So all I'm saying is that the IGV [13] position controls, has direct impact on the bleed [14] control valve by modifying the magnitudes of the [15] proportional and integral controls.

[16] **Q:** Which way does it modify them, does it [17] make them bigger or smaller?

[18] **A:** No, as I said earlier, the value [19] continues but what it does do is it imposes a [20] fixed value, a high flow because of the [21] characteristics that, the characteristics of this [22] compressor, so it has an additional — it has an [23] additional capability in order to set the bleed [24] control valve open so that all the flow goes to

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[1] the aircraft.

[2] **Q:** And Mr. Muller, does IGV position [3] determine or switch bleed select signal from zero [4] to one or from one to zero?

[5] **A:** What it does is it establishes a value of [6] zero or one, which is used in the determination of [7] that fixed value to keep the bleed control open, [8] even though during the entire time the [9] proportional and integral control signals are [10] generated and primarily going along.

[11] **Q:** Does it switch the value from zero to [12] one?

[13] **A:** It doesn't switch the value, as I [14] understand it that value continues but what it [15] does is it imposes a fixed value on the control [16] bleed value as the signals continue to be [17] generated.

[18] **Q:** What I'm asking is, the effect on this [19] red line will not effect, the effect of this red [20] line to BCVCTL is whether it's zero or one?

[21] **A:** This BCVCTL continues to function and [22] operate. What this determines is if there is an [23] additional set value, fixed value which is used to [24] generate, I know I think it's a ten volt signal,

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[1] which then goes to the bleed control valve and [2] fixes it open to keep it in this high flow [3] position so that it does not because of the [4] compressor characteristics, the flow [5] characteristics of this compressor.

[6] So it does not mistakenly identify [7] that it finds itself in a low flow condition.

[8] **Q:** That's a function of whether this bleed [9] select value is zero or one?

[10] **A:** This value of zero or one is used in [11] determining if the fixed value is to be imposed.

[12] **MR. HERRINGTON:** My colleague [13] suggested a microphone so that I could be heard. [14] Is there one available?

[15] **Q:** Stepping back, Mr. Muller, what is the [16] event that adjusts the relationship between the [17] magnitudes of said integral and proportional [18] control signals and the magnitudes of said [19] parameter variations as a function of the position [20] of the inlet guide vanes?

[21] **A:** I'll wait until you put — it's not fair [22] to answer a question before you are properly mic'd [23] up.

[24] **Q:** Thank you.

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[1] Please.

[2] **A:** As I've said, as I said formally, the [3] value is used for setting the — for invoking a [4] fixed value that will fix the bleed control valve [5] open to make sure it stays under high flow. So [6] the actual surge control system, the BCVCTL signal [7] continues, and it's also available but it effects [8] it because it imposes another value so it's [9] modified in that fashion.

[10] **Q:** Let me show you another chart. Let me [11] reask the question because I'm not sure you [12] addressed it. What event is it, how do you know [13] that there has been an adjustment between the [14] magnitudes of the integral and